REPORT

ON THE

Winnipeg and Hudson's Bay R'y

AND

STEAMSHIP COMPANY

BY

W. MURDOCH, C. E.

Winnipeg, Man.:
TIMES STEAM BOOK AND JOB PRINTING ESTABLISHMENT.
A. D. 1884.

REPORT

ON THE

Winnipeg and Hudson's Bay Railway & S.S. Co.

BY

W. MURDOCH, C. E.

WINNIPEG, Manitoba, May 28th, 1884.

To HUGH SUTHERLAND, ESQ., M. P.,
President Winnipeg & Hudson Bay Railway and Steamship Co.

Sir,—I herewith submit the following report to accompany a statement of the financial basis of the W. & H. B. R'y & S.S. Co.

The Dominion Government of Canada, in pursuance of their declared policy have decided to grant but one charter for a railway from this point to Hudson's Bay, they refused to grant, during last session, a charter to the Winnipeg, San Francisco and H. B. R'y, and the Montreal Company now dissolved in accordance with section 12 of the Act of incorporation, which took effect on the twelfth day of May, 1884. Your company have now the only charter in existence, and therefore, most valuable, having no competitors and guaranteed against any. In addition to the main line they have the valuable branch from a point north of Lake Winnipegoosis, westward to the Canadian Pacific Railway, through a fine country unsurpassed for timber and minerals, which adds much to the value of the charter, from the all-important fact that the products of the West will then be carried by the shortest route to the seaboard and will be a remunerative additional source of revenue to the main line.

The geographical position of Winnipeg, the initial point of railway and the entrepot to the great North-West, is, as nearly as possible, half way from the Atlantic to the Pacific, being about 1,283 miles from each in a straight line, and only 593 miles from the head of navigation for ocean steamships on the Nelson River *via* railway 83 miles from its mouth above where it empties into Hudson's Bay, at which place, which is known as Limestone Falls, there is a basin three miles in width capable of holding the British navy, having a depth of 60 feet or more water, where vessels could remain with entire safety winter and summer.

Public opinion is so well satisfied as to the practicability of Hudson's Straits for steam navigation that I shall do no more than quote for your information, the comparative distances to Liverpool.

From Winnipeg to Montreal, *via* Chicago	1,703	miles.
" " " *via* C.P.R. route	1,440	"
" Montreal to Liverpool	2,990	"
Or, a total on the first-named route of	4,693	"
And a total over the second-named route of	4,430	"

The distance from Winnipeg to Liverpool *via* Limestone Falls is 3,617 miles, or 813 miles shorter than the shortest, and 1,076 miles shorter than the longest route. Limestone Falls, on the Nelson River, is 34 miles farther to Liverpool than Montreal, and 16 miles nearer than New York. This advantage in distance of course applies to the Pacific trade, British Columbia and Japan being nearer, *via* Limestone Falls, by 1,117 miles than *via* Montreal, and 2,136 miles nearer than *via* New York.

From Limestone Falls to Liverpool there would be 88 miles more of water carriage than to Churchill Harbour, which means 122 miles of railway construction saved, as well as its operation for all time to come. The North-Western States would be benefited nearly as much as Manitoba, and the same as our North-West Territories, and are now urgent in their agitation for the construction of the Hudson's Bay Railway, which would be in direct communication with waterways *via* Red River and Lake Winnipeg to Sea Falls, on the Nelson, which is practically the head of navigation on Lake Winnipeg, and distant by water 352 miles from Winnipeg. Through this channel will flow the grain trade of Minnesota and Dakota, now estimated at 15,000,000 bushels for export annually. From Sea Falls there would only be railway carriage 241 miles to Limestone Falls, the head of navigation on the Nelson River during summer, and by railway to Winnipeg in winter.

The products of the Great Saskatchewan valley from the West would be transferred at Grand Rapids, to and from Europe, *via* the railway, and also the Western branch line connecting with the Canadian Pacific Railway would join the main line at this important junction, which nature has given a water power for manufacturing purposes unsurpassed. The length of the Grand Rapids is nearly three miles, and the fall in that distance 44 feet. Looking forward to the time when the immense productive area of the Saskatchewan valley shall pour its golden harvest of grain down the channel of that mighty river, in the steamboat and barge lines of the future, conveying its wheat to the seaboard, is not this point destined to become a Canadian Minneapolis? It requires no prophetic eye to see in the near future the development of this magnificent water power, and the building up by its means of a city that may rival any upon this continent, with a harbour in Cross Lake, the banks of which are suited for the construction of twenty miles of wharves and hundreds of elevators, where fleets of barges could lie safely out of the current, and the shipping of the river, and of Lake Winnipeg, find their cargoes, it is not difficult to conceive, that the wilderness of the present may be soon transferred into the city of the future.

In promoting such growth this railroad will play an important part. In view of the above circumstances it would be advisable to first construct that portion of railway from Limestone Falls to Sea Falls, on the Nelson River, a distance of 241 miles, which would give a summer route for immediate use, and materially reduce the cost of construction of that portion between the latter point and Winnipeg, which means traffic over our own road, avoiding large outlays in transportation over other roads, to bring iron, etc. in for construction, besides the great gain in paying costs of transportation on our own short line to ourselves, instead of over a large additional length of line to foreign corporations, *via* New York or Montreal, which I compute would be at least half a million dollars saved.

This is the shortest possible route, and the cheapest to construct and operate, being common to all points which will be served by the completed line, namely, the Great Saskatchewan Steamboat Service, from the Rocky Mountains and intervening country to Grand Rapids, thence by tramway (now in operation) to Lake Winnipeg; thence by steamer to Sea Falls; until that portion of railway between Sea Falls and Grand Rapids is completed. (Construction should begin at all available points on the main line when the surveys are completed.)

From the south, until the railway is constructed between Grand Rapids and Winnipeg, all freight and passengers can come by water to Sea Falls. Thus, until the line is completed, by the waterways of the country alone, passengers and products can be taken from the centre and western portions of this continent to Europe with the aid of the first 241 miles of the Hudson's Bay railway. This is a startling fact not heretofore considered, and means cheap transportation for exportation of our products to Europe, and the same advantage *to European manufactures imported to this country.* We may reasonably expect an enormous increase in volume of *such importations*, as reduced rates of transport will enable dealers here to purchase from Great Britain, *via* this short route, large quantities of goods which are now purchased in the United States, consequently increasing British manufactures while developing this fertile country, at the same time not forgetting the advantages of this railway as a military road over any route on the continent, which is obvious to all.

To continue, let us examine the special east-bound grain tariff of the Canadian Pacific Railway. From Grenfell to Port Arthur, a distance of 714 miles, their rate is 38 cents per 100 pounds or 28 8-10 cents per bushel. Now, it is to be presumed that this tariff is prepared by experienced hands, to cover not only operating expenses, but the interest on capital expenditure.

Take the same rate per mile, it gives 19 cents as the cost of transporting a bushel by all rail route to Limestone Falls. Contrast this with the cost of reaching the sea by other routes:—

Route 1.—	Winnipeg to Montreal, all rail	40c per bus.
" 2.—	" " Pt. Arthur, "	25 8-10 "
	Pt. Arthur to Montreal by boat	
" 3.—	Winnipeg to Duluth, all rail	33 6-10 "
	Duluth to Montreal, boat	

or a saving on each million bushels shipped *via* Nelson

Over route 1, of	21	cents per bushel, or	$210,000	00
" " 2, "	6 8-10	cents per bushel, or	68,000	00
" " 3, "	14 6-10	" " "	146,000	00

But while contrasting our all rail route with their rail and water route we are doing ourselves an injustice. During the time they can use their water route we can use ours. Taking the distance from Winnipeg to Sea Falls at 352 miles it is estimated that by water carriage a bushel of grain could be delivered on the cars at the head of navigation for four cents; to this add Canadian Pacific Railway tariff rates for the 241 miles from thence to Limestone Falls and we have 7 7-10 cents per bushel, or a total of 11 7-10 cents per bushel, making a saving over route two of 14 3-10 cents per bushel and over route three of 21 9-10 cents per bushel. Now, if we cannot compete with such differences in tariff, and paying operating expenses, in what position must the opposing lines be placed?

It would be premature and injudicious for me to indicate what I think this carrying trade can be done for, although I feel confident the above figures are in excess of what will be required to make the road a financial success. I content myself, therefore, with the basis of the Canadian Pacific Railway tariff, supposing that no one will be hardy enough to controvert such high authority.

COST.

On consulting the accompanying plans, shewing the line the road is to traverse, I have classified the different sections between points marked thereon, in comparison with the known cost of railways already constructed in a similar country, and therefore assume my estimate to be approximately correct, with a margin rather over than under the actual cost.

The free land grant by Order-in-Council dated the 7th May, 1884, embraces in the Province of Manitoba, 6,400 acres per mile of line, and outside to the seaboard, including both the Nelson and Churchill harbors, 12,800 acres per mile of road, together with the branch line from the west, which will be selected either along the line of railway or elsewhere, as may be arranged between the Government and Company on classification of the lands to be taken, which is an important asset.

No better security for the investment of capital can be obtained than the bonds issued upon lands under the above conditions. Aside from the free land grant the value of the charter is so important for the successful development of this country, and the enormous amount of varied products to be transported over it, would alone justify its construction, and I am safe in stating that it will prove a most profitable security to all investors in its bonds; indeed so popular is the undertaking in the North-West and in the adjoining States that numerous public meetings have been held throughout this country and across the line in Minnesota and Dakota, shewing the people are a unit in demanding the charter from the Dominion Government, and it is a

matter of congratulation with the public at large that a charter is obtained by the present Company for so profitable and so important an undertaking in the vital interests of this country.

DESCRIPTION OF COUNTRY

through which line passes, according to Mr. Adrian Neison, C. E. and explorer.

From Winnipeg to Grand Rapids the distance by the railway line is 238 miles; there is 50 per cent. of No. 1 quality land, the balance is equally good by easy drainage, cutting beaver dams which cause flooding in places, and there is 40 per cent. of the timber, composed of spruce and tamarac, merchantable and fit for saw-mill purposes, which is now being manufactured by mill operators from Winnipeg; and immediately to the West of the Line up to Pelican River there is a productive farming country second to none in the North-West. At Grand Rapids there is plenty of gravel for ballast. The spot selected for crossing the Great Saskatchewan is at the Head of the Rapids where two islands divide the channel called Rocher Rouge, and the banks are 20 feet in height. There is plenty of stone here of a suitable description for bridge purposes, and any quantity of cedar for ties. The bridge will be some 700 feet long. At this point to the west and tributary to the railway as a source of revenue, is the finest spruce timber in Canada, averaging fifty million feet B. M., per fifty square miles of area, within fifty miles, which will be brought to the railway *via* the Saskatchewan River.

From the Saskatchewan we shall receive both bituminous and anthracite coal, brought in barges from the mines, say 1,000 miles of river navigation, at a cost of not more than $3.50 per ton, add $2.50 for transfer and railway charges, and $2.00 per ton at the mines, and coal should be laid down in Winnipeg from this source at $7.00 per ton just one-half of its present price. From the terminal point on Hudson's Bay we shall receive direct from Europe, without delay or bonding formalities, the merchandise that dribbles more or less slowly over the lines to the south. This traffic with immigrant moveables will fully occupy the southward bound trains during that part of the year when such carriage may be looked for; the sea-fisheries will supply the south as far as Chicago, and the various industries opened up on Hudson's Bay will give their quota to solve the question of an all year round paying traffic, together with the fisheries of Lake Winnipeg abounding in the finest white fish in the world beside lake trout, 200 tons of which were shipped to Chicago this last season, and with railway facilities this industry will increase, and be a source of revenue to the road.

From Grand Rapids to Sea Falls we immediately enter the Huronian formation, which continues to the west branch of the Nelson River; there is twenty-five per cent of timber land, and the balance is of second and third quality; between the east and west branch the land is sandy and level, and continues as far as the end of section 9 as seen on plans; here we cross the height of land, which is hardly perceptible being a watershed twenty feet across and five feet high.

The bridging here is important: the main channel is 100 feet wide, with 20 feet of water, and the approaches of three-quarters of a mile long will be in about four feet of water.

The East Branch will require three bridges, each 600 feet long. Rock foundations in an average of 6 feet of water; 18 feet above water level.

From Sea Falls to Fox River there is 25 per cent. of No. 1 land, 25 per cent. of No. 2, balance of No. 3—the latter requiring drainage which beaver dams have flooded. On some portions, sphagnum moss, to the depth of two feet, covers the ground like a blanket, on top of which ripe strawberries are found in profusion. Burning the moss, and cutting the beaver dams would effectually reclaim those lands.

Fox River will require two bridges, one of 100 feet, and one of 400 feet. The banks are 60 feet high. The country between the above points, with the exception of the first thirty-five miles, is good level land, and is heavily covered with timber from the Nelson River south and eastward for 250 miles, consisting of spruce, Norway pine and Banksian pine, and will yield 20,000,000 feet per fifty square miles of area. Oxford House is sixty miles south-east from the railway line, and is situated on a stiff clayey soil, which here produces barley and all kinds of garden vegetables in perfection. This locality is remarkable for its abundance of wild gooseberries, acres of ground in some places being covered with gooseberry bushes. The land to the north of the lake, opposite to Oxford House, rises to an elevation of about 200 feet, and appears to be higher than any other ground in this part of the country. I was informed that it consists entirely of soil, underlaid by drift materials, no rock cropping up in the vicinity.

From Fox River to Limestone Falls, a distance of sixty miles, this portion is covered with moss three feet deep, caused by beavers damming the small waterways of the country, which may be easily removed in the fall of the year, and reclaim this portion of the country. The spruce timber lying on the ground is of an average size of flour barrels in diameter, showing that the ground must be rich to produce a growth of such size; the trees lie in thousands, caused by the water remaining on the surface, from the action of beavers, as the country lies high above the main river and tributaries.

The banks of the Nelson are 283 feet above the river, and a level country on both sides. At this point the Nelson is three miles wide, with a depth of water over 60 feet; and on the south bank it slopes back for a mile extending along the shore, with coulees leading parallel to the banks, affording facilities for the railway to reach the head of navigation, and crossing with a 700 ft. bridge at Limestone Falls, a few feet above the water.

From Limestone Falls to Port Nelson is an open country; along the river there is no timber, and is easy for railway construction, with an average fall of 3½ feet per mile.

At Seal and Gillam Islands, according to Adrian Neison, C.E. and Explorer, the banks there are 111 feet high, and the river has a depth of 23 feet of water, and only 200 feet of dredging is required at the Islands to give a continuous ship channel to Limestone Falls.

NELSON RIVER AND HARBOUR.

The Nelson is the great trunk river which discharges all the waters which have been gathered into Lake Winnipeg from every point of the

compass, and has a volume equal to about four times that of the Ottawa at the Capital of the Dominion. Its length is about 400 miles, in which distance it has a descent of 710 feet from the surface of Lake Winnipeg. If we add the length of the Saskatchewan to that of the Nelson, we shall have a total of 1,300 miles from the source of the former in the Rocky Mountains to the mouth of the latter at Hudson's Bay.

The Nelson may be ascended by large river steamers to a distance of about eighty miles from the sea, according to soundings made by Professor Bell. He also says in his report of 1879-80 :—

"Most of its estuary becomes dry at low tide, but a channel runs through it near the centre, as far as the head of tide water. I sounded this channel in a number of places, in 1878, '79 and '80, and although an average depth of about two fathoms at *low* water was found, continuous soundings throughout might have shown interruptions or shallower water in some places. As stated in previous reports, there is a section at the head of tide, or between the tidal portion and the regular inland channel of the river, in which not more than 10 feet of water was found. This may extend for about two miles above, above which an apparent continuous channel, with a depth of about 20 feet, according to our soundings, extends to the lowest Limestone Rapid, which is the first break in the navigable part, and is between 40 and 50 miles from the head of tide, or from 70 to 80 from the open sea. If the section referred to were deepened, steamers coming in from the sea might enter this part of the river and find perfect shelter, or even proceed up the stream to any point below the rapid referred to. In continuation of the channel running down the estuary, a "lead" of deeper water extends into the Bay, and forms the "North River," or "York Roads," with excellent anchorage. The tides at the mouth of the Nelson river amount to 15 feet."

Sir Thomas Button's Journal, 1612 :—"After which time, came on the new winter, with much stormy weather, as he was constrained to winter there, in a small rile or creek on the north side of a river in latitude 57°, 10′, which river he named Port Nelson, after the name of his master (whom he buried there), putting his small ship in the foremost and barracadoe both of them (with piles of firre and earth), from storme of snow, ice, raine, floods, or what else might fall."

Ellis states that the Nelson is six miles wide at the entrance, with a very good channel about a mile broad, and from five to fifteen fathoms deep.

Robson made extensive soundings of the Nelson River, and published a plan of about 40 miles length of it and the Hayes' River. He gives excellent depths up as far as Flamboro Head, a distance of 20 miles from the mouth. Above here are two islands, Gillam and Seal Island, where Robson says ships could lie in safety summer or winter.

In 1782, La Perouse, the French Admiral, with a seventy-four-gun line-of-battle ship, and two frigates of thirty-six guns each, anchored at the mouth of Nelson River, not finding sufficient water in Hayes' River. He landed 250 men, mortars, guns, and provisions for eight days.

Certainly these were large-sized vessels to be in these waters, and it proves that the French considered the taking of the forts a matter of

importance, and also that the water at the mouth of the Nelson was of a good depth.

A line to Churchill from Limestone Falls would run over baren land composed of gravel and boulders, presenting no engineering difficulties.

At Port Nelson abundance of anthracite coal can be delivered from Long Island on the east shore of Hudson's Bay, as well as lignite from Moose river for motive, manufacturing and domestic purposes.

The fuel is invaluable for operating the road, having it so close at hand; also petroleum for lubricating the machinery and rolling stock and lighting purposes is found in the vicinity.

Iron in immense quantities exists in sight on Mansfield Island and at many other points on the shores of the Bay, besides most valuable minerals enumerated in this report which I need not particularize now. Suffice it to say that the minerals are so abundant, and diversified in character, embracing all the precious metals as well as all minerals for economic purposes found in other parts of the world, are all centered in the vicinity of Hudson's Bay.

Where in the wide world can be found greater inducements or a richer country for a railway to develope or better security for the investment than in this railway, which is designed to develope these illimitable resources, and give employment to millions of the human race, and as a natural consequence, immense returns of profit to the company, thereby insuring regular payment of interest to bondholders.

CLIMATE OF HUDSON BAY, ETC.

I herewith attach extracts from a paper on "Northern Waters," by Charles N. Bell Esq., a valuable document pertaining to "Hudson's Bay and Straits," their resources in minerals, fisheries, timber, furs, game, other products, &c.

"The countries about the Bay are capable of great improvement, the lands southward and westward of the Bay are in good climates, equal in their several latitudes to those in Asia and Europe, and the climate improves farthur within land."*

"It is vastly colder at Fort Churchill than a few leagues up the river among the woods, where the factory's men lived comfortably in huts or tents all the winter, hunting, shooting and fishing the whole season."†

Robson, Dobbs, Ellis, Hearne and other writers state that when Europeans have once lived in the country about the Bay, that they are never content to live out of it again, and this fact is proved in our own Province every day, the climate during the winter months at York is but very little colder than at Winnipeg, and during the summer it is warmer there than in this Province.

OPENING AND CLOSING OF NAVIGATION.

Summary of the opening and closing of Hayes River, opposite York Factory for various years from 1830 to 1880, according to report of Mr. Wood, Government Meteorological Observer at York Factory.

---

*Robson, page 62. †Dobbs, page 55.

	Date of Opening.	*Date of Closing.*
1830	May 17	December 2
1835	" 24	November 18
1840	" 12	" 16
1845	" 22	" 24
1850	" 31	" 28
1855	" 21	" 24
1860	" 18	" 19
1865	" 16	" 20
1870	" 11	" 27
1875	" 19	" 15
1880	" 26	" 20

The records of the Hudson's Bay Company, as presented to the Government in 1880, show that the Hayes' River, at York Factory, for an average of 53 years was open on the 15th of May. Only once in the 53 years did it remain closed till the end of May or first of June. Once (in 1878) the river closed as early as the 3rd of November, but the average closing for 53 years was about the 20th of November. It must be borne in mind that the Hayes' is but a small river in comparison with its neighbor, the Nelson, which is distant from it at York about six miles. The Nelson closes much later than does the Hayes, if indeed it can be said it closes at all.

It is interesting, then, to note the comparison between the opening of the harbors of York and Montreal, though a fortnight is here given against York to clear the river and an equal time in the fall when ice first forms:—

	Montreal.	*York.*
Opening of harbor	1st May.	1st June.
Closing of harbor	25th of Nov.	10th Nov.

This proves conclusively that the harbor at York is open and clear of ice for five-and-a-half-months of the year, and that vessels could approach docks between these dates. At a port on Nelson River these dates would be extended.

TABLE OF TEMPERTURE.

The Meterological Department, at Toronto, have kindly given me many statistics of their stations at York and Moose, and a few extracts from them are given herewith, though it is impossible to make many comparisons, as the returns for some months of either summer or winter have not been made to the head office.

Lowest temperature on any day during year.

	Manitoba.	Moose.	York.
1876,.....	—44		—53
1877,.....	—47		—45
1878,.....	—36	—35	—33
1879,.....	—50	—45	
1880,.....	—44	—39	—40
1881,.....	—40	—39	—39

Highest temperature on any day during year.

	Manitoba.	Moose.	York.
1876,.....	97		99
1878,.....	93	92	106
1879,.....	93	84	
1880,.....	90	87	
1881,.....	93	91	

The *mean average* temperature for several months at Moose:

	1878.	1879.	1880.	1881.
May, ...	47	40	40	48
June, ...	57	50	55	47
July, ...	61	60	59	64
August, ...	63	58	55	61
September.....	52	49	52	52
October,.....	41	45	38	33

The *mean average* temperature for several months at York.

	1876.	1878.	1882.
May, ...	38	33	35
June, ...	49	65	52
July, ...	57	74	68
August, ...	56	59	55
September, ...	46	38	49
October,.....	26	22	28

The *mean average* temperature for several months at Winnipeg.

	1876.	1877.	1878.	1879.	1880.	1881.
May,.....	53	55	48	53	55	57
June, ...	60	57	65	64	53	62
July, ...	67	68	70	68	66	69
August, ...	64	64	67	64	62	66
September, ..	53	56	52	51	52	51
October, ...	37	39	36	44	38	34

From July to October the temperature at Moose and Winnipeg is very much alike. In September and October, Moose has the best of it.

It will be understood that the readings for York and Moose are taken at the forts, which are on tide water, and have been described as most

exposed, but they give us a fair idea of what the climate is about the Bay, as far north as York or Churchill.

The fact of the water in the rivers rushing down before the ice is broken up at lower levels, proves that the climate inland is more genial, and this is the case with all the rivers flowing into the Bay.

According to Ballantyne, vegetation in the valley of Hayes' River, thirty miles from its mouth, on the 23rd June, was found by him to be in an advanced state, the trees being covered with foliage, and on the 25th June he described the Hill River: "Along its gentle sloping banks the country was teeming with vegetable and animal life."*

E. S. Matheson, C. E., under date Feb. 4th, 1884, writes me in reply to my question as to how he stood the cold at the mouth of the Nelson River, when surveying it, during the winter of 1882-83, as follows:—"I found the climate much milder than I had expected. In November we built our shanty in five or six days and commenced work, and for nearly four months we slept out without tents, and there were not more than ten days, during that time, in which we had to remain in camp through inclemency of the weather. When you take into consideration the exposed place in which we were working, viz., on the Nelson River and the sea coast, you can rest assured that the cold would not prevent men or machinery from working farther inland."

"In summer, when the wind is about west-south-west, it becomes sultry, and if it happens to blow fresh, it comes in hot gusts, as if it blew from a fire, and the hardest gusts bring the greatest heat; but this is not the case when the wind blows from any other point."†

This was written in 1752 as a proof that a genial and hospitable region lay in that direction, for it must be explained that at that date nothing was known of the interior to the south-west of York Factory. It is most likely that the "chinook" or warm winds from the Pacific may reach even as far east as the Bay, and produce the "hot gusts" mentioned by Robson. We know that for a certainty a genial and hospitable region does exist in the position indicated by him.

"I took the temperature of the sea upwards of twenty times during our voyage (about 550 miles north of Moose on the east main coast), which extended over the greater part of July, August and September, and found it to average 53° Fah. I also noted the temperature of the rivers we visited, and found that the average of five of them was 61° Fah. We bathed in the water almost daily, and found the temperature agreeable. We saw no ice, with the exception of a little "bay ice" at the commencement of our journey, which had been driven into the neighborhood of the mouth of Moose River, after northerly winds had prevailed for many days. There was very little rain, and only two or three days of fog. Average temperature of the sea at three to four feet below surface for trials during three months was 53°, and of the air 62½°. These observations were taken at various hours between 7 a.m. and 9 p.m."‡

In the autumn of the same year (1864) the schooner *Martin* arrived at Moose Factory from York with a portion of the cargo of the *Prince Arthur*, about the end of October. She reached Moose Factory just in time to be hauled up out of the fast forming ice." (Letter of Charles

---

*Ballantyne's Hudson's Bay. † Robson, page 11.
‡ Dr. Bell, 1877.

Horetzky, lately in the Hudson's Bay Company's service, to Col. Dennis, 4th Nov., 1878.)

"In regard to the country for agriculture, the country that I have spoken of, south and south-west of James' Bay, lies in the latitude of Cornwall and Devonshire, in England, and southward of that, it is in the same latitude as the northerly parts of France; and while these countries enjoy exceptionally favorable conditions, there is no pecularlity of climate that would make the district I have referred to, worse than the average of the face of the earth in those latitudes, and, therefore, I think it is likely to be of value for agriculture, as far as climate is concerned.

"The temperature below the immediate surface of Lake Superior is 39° Fahr; along the east shore of Hudson's Bay it averaged 53° in the summer months.

"What is the liability to summer frosts in the country around Hudson's Bay? In the larger area of agricultural land south and south-west of James' Bay, I think not very great. In 1877, on my homeward journey, I left Moose Factory on the 1st of October, and at that time all the tender plants—the tobacco plant, castor oil bean, common beans, cucumbers, bolsams and other tender plants—were perfectly green, standing in the open air; and probably remained so for some time after I left as we had no frost. And at the posts of the Hudson's Bay Company, inland, they are not often troubled with early autumn frosts.*

"How about late frosts in the spring? No late frosts in the spring, I think the sowing is done on an average at the same time as in corresponding latitudes in Lower Canada. I have spoken of the southern region. Furthur to the north-west, at Norway House, in 1879, they had a frost in the latter part of September, which blighted the tender plants and it was remarked as the first that had occurred there in thirty-four years. Wheat ripens perfectly every year in that region.

"Where is that? About twenty miles down the Nelson river from the north end of Lake Winnipeg. The climate there, I think, is as good as in Manitoba on account of certain favorable conditions.

"Moose Factory enjoys the most favorable climate on the Bay. You are there away from the influence of the open sea. James' Bay is far south, and comparatively narrow, and the water is warmer than at York Factory."†

Ellis mentions that in the spring of 1747, "the ice in Hayes' river gave way on the 16th May, floating gently to sea. On the 5th June ninteen bark canoes, laden with furs, passed down on their way to York Factory, and on the next day, seventy more,"—a clear proof that the rivers, inland, had been open at least a fortnight or three weeks previously.‡

Prof. Hind, in the course of his evidence:—"We must bear in mind that ice is often found in the lakes near the water-shed, west of Lake Superior, about the middle of May, and Lake Winnipeg is sometimes impassible at its northern extremity during the first week of June. From these comparsions it will be seen that the climate of the Nelson River

---

* See Table of *mean average* at Moose, for September of various years, on page 49.
† Dr. Bell before House of Commons Colonization Committee.
‡ Ellis, page 209.

valley is of an exceptionally favorable character away from the coast line. It can scarcely excite surprise that there should be a large tract with a good climate and great depth of soil of drift clays in the vicinity of the valley of the Nelson River, for it is the lowest portion of the whole basin of Lake Winnipeg, and is consequently under the influence of the drainage waters from three hundred thousand square miles of land lying altogether to the south of the narrow depression, not, perhaps, more than forty miles broad, through which the Nelson River finds its way. §

SUN'S RELATIVE INTENSITY.

Prof. Hind gives us some very valuable data respecting the influence of the sun during the long days experienced in these northern regions, and I give a table prepared by him :—

TABLE showing the Sun's Relative Intensity, and the Length of the Day in Latitudes 40° N. 50° N. and 60° N.

	Latitude 40 N.		Latitude 50° N.		Latitude 60° N	
	Sun's Intensity	Length of Day.	Sun's Intensity	Length of day	Sun's Intensity	Length of Day.
May 1	80	13.46	77	14.30	70	15.44
" 16	85	14.16	83	15.16	79	16.56
" 31	88	14 38	87	15.50	85	17.56
June 15	90	14.50	89	16.08	88	18.28
July 1	90	14.46	89	16.04	88	18.18
" 16	87	14.34	86	15.42	84	17.42
" 31	84	14.08	81	15.04	71	16.38
Aug. 15	79	13.36	74	14.18	68	15.24
" 30	72	13.02	65	13.28	57	14.08
Sept 14	65	12.22	58	12.32	46	12·46
" 29	57	11.44	47	11.36	36	11.26

"The conditions required for the adaptation of a certain area to agricultural purposes, apart from altitude above the sea and the character of the soil, are generally reduced to two, namely, the mean temperature of about 90 days, as during the summer or growing months, and the degree of humidity during that period.

"There are, however, two other conditions which exercise a very great influence upon vegetable growth throughout an area extending over many hundred miles to the north. These are the measure of the sun's intensity as regards light and heat, and the duration of the length of the day. As we move from Manitoba say in lat. 50° to Peace River in lat. 56° (or York in 57°), this important fact has to be noticed, that the length of the day in summer increases in a greater ratio than the sun's intensity of light and heat diminishes. It is not heat only which affects the growth of vegetation, it is also the duration of solar light in the day. The longer the day the greater the total amount of heat and light which will be received by vegetables."

§ Hind's Report.

Look at the table and you will see that in lat. 40° the sun's intensity is 88, on May 31st, the day being 14 hours 38 minutes long. In lat. 50° the sun's relative intensity of light and heat on the same day is 87°, but the day is 15 hours and 50 minutes long. In lat. 60° the sun's intensity on the 31st May is represented by 85, but the day is 17 hours 26 minutes long. The day is widely different in length, and the heat and light have a longer time to act on vegetation under the more northern meridians.

In connection with the above table, a comparison of it with the meteorological tables given in this report, will prove highly interesting.

EXPOSED POSITION OF FORTS, VEGETATION, STOCK, ETC.

"The present situation of the Prince of Wales Fort, on Churchill River, is vastly cold, and, for that reason, very inconvenient, as are all the other factories in the Bay, all the others being fixed with a view only to profit, and this alone for profit and strength, and therefore surrounded on all sides, without any shelter, by frozen sea and river, exposed to all storms, being vastly colder than a few leagues up the river amongst the woods, where the factory's men lived comfortably in huts and tents all the winter, hunting, shooting and fishing the whole season. When the cold continued at York Fort, and there was ice in the river, four leagues above they had a fine spring, all the trees in bloom and very warm weather. At present the factories of Moose and Albany are situated very unhappily, being placed in the swamp, at the mouths of the rivers, for the Company's aim being trade, they don't regard the soil, aspect, or situation where they fix them, provided they are upon navigable rivers where their ships can approach them and the natives can come in their canoes."*

It is likely, for the above reasons, that reports generally heard give such a miserable account of the privations and hardships men suffer under when living at the trading posts about the Bay, whether of the French or English.

Moose and York Factories are, however, not so much exposed but that they can grow plenty of vegetables for their own use, as is assured us by all who have visited these places. Dr. Bell was told at Moose, in 1875, that the previous year they cropped 1,700 bushels of good potatoes. He also saw oats, barley, beans, peas, turnips, beets, carrots, cabbages, and onions grown there.

MINERALS.

The Geological Reports of 1879-80 give very encouraging prospects of the likelihood of valuable minerals being found about the Bay. I quote from the reports of the above named years.

"Minerals may, however, become in future the greatest of the resources of the Hudson's Bay. Little direct search has, as yet, been made for the valuable minerals of these regions. In 1875 I found a large deposit of rich ironstone on the Mattagami River. In 1877 inexhaustable supplies of good manganiferous iron ore were discovered on

* Dobbs, page 55.

the islands near the east main coast, and promising quantities of galena around Richmond Gulf, and also near Little Whale River, where a small amount had previously known to exist. Traces of gold, silver, molybdenum and copper were likewise noted on the east main coast. Lignite was met with on the Missinabi, gypsum on the Moose, and petroleum-bearing limestone on the Abittibi River. Small quantities of anthracite and various ornamental stones, and some rare minerals were collected in the course of our explorations around the Bay. Soapstone is abundant not far from Mosquito Bay, on the east side, and iron pyrites between Churchill and Marble Island on the west. Good building stones, clay and limestones, exist on both sides of the Bay. A cargo of mica is said to have been taken from Chesterfield Inlet to New York, and valuable deposits of plumbaga are reported to occur on the north side of Hudson's Strait."

Many of the navigators of the past century mention the finding of minerals.

In answer to the question asked by the Select Standing Committee on Immigration and Colonization of the House of Commons, Ottawa, 4th April, 1883, in a general way, in the Hudson's Bay territories, "are there many useful minerals?" Dr. Bell's answer was:—"As far as we know there are, but very little search has been made there. I can, however, mention numerous minerals which are already known to exist. They embrace iron, as hematite, magnetite, clay, ironstone and rich magniferous iron ore on the east main coast, copper in its native state and in various combinations; lead, silver, gold, molybdenum, antimony, manganese, chromium, phospate of lime, jade, chrysophras, agate, cornelian, malachite, jasper, serpentine, jet, lazulite, petroleum, asphalt, peat, anthracite, bituminous coal, lignite, limestone, granite sandstone, and sand for glass-making, moulding sand, clays, merls, ochres, gypsum, iron pyrites, salt, medicinal waters, sheet mica, soapstone and plumbago. These are all known to occur, many in various parts of the territory, and most of them certainly well worth looking after."

Many years ago, Sir John Richardson was convinced that it would not be long before the value of the mines of Hudson's Bay territory would far surpass that of the fur trade.

Mr. Dickson, formerly in the service of the Company, thus refers to the mineral deposits on the shores of the Bay:—"At a certain point on the east coast of James' Bay there is a vein of magnetic iron, so extensive that, when examined by a practical English miner, in 1865, it was pronounced by that gentleman to be one of the most valuable veins of ore in existence. Plumbago, in a pure state, is also to be found in the same locality; and at this place is the commencement on the sea coast of a range of mineral-bearing rocks, which extend along the mainland, and among the islands near the sea shore, for a distance of 600 miles, with a width of from 50 to 200 miles or more, into the interior of the country. * * * At certain points on this range a partial examination has been made, showing that galena, iron, and copper are procurable in almost unlimited quantities, and during a thirteen years' residence at various parts on the east coast, I had ample opportunities of examining both its geological and mineralogical formations at a great many points, both in James' and Hudson's Bay, and have no hesitation

in stating that I believe it to be the most valuable mineral region in the Dominion, perhaps on the Continent."

Mr. Hoffman, Chemist of the Geological Survey of Canada, analyzed a specimen of anthracite, from Long Island, on the east coast with the following result :—*

Fixed carbon	94·91
Volatile combustible matter	1·29
Water	3·45
Ash	0·35
	100·00

Mr. Hoffman reported also the composition of the Moose River lignite, as follows:—"A piece of this lignite, immersed in water for over three days, remained apparently unaffected; it had not disintegrated, nor imparted any coloration to the water.

This specimen having been kept in the laboratory for months, may be regarded as having been thoroughly air-dried.

Two proximate analyses by slow and fast coking gave :—

	Slow coking.	*Fast coking.*
Fixed carbon	45·82	44·03
Volatile combustible matter	39·80	41·39
Water	11·74	11·74
Ash	2·84	2·84
	100·00	100·00

TIMBER.

"Some of the timber found in the country which sends its waters into James' Bay may prove to be of value for export. Among the kinds which it produces may be mentioned white, red and pitch pine, black and white spruce, balsam, larch, white cedar and white birch. The numerous rivers which converge towards the head of James' Bay offer facilities for "driving" timber to points at which it may be shipped by sea-going vessels."

In addition to the above list, in another report, Dr. Bell gives the following kinds of trees:—White elm, mountain maple, pigeon cherry, mountain ash or rowan, green willow, cotton-tree, cypress.

On the head waters of the Moose River, white pine is abundant and of good size. Red pine also exists, and extends rather further north than the white. Then there is "Jack pine," or "Cypress," or more properly Banksian pine, which, though not a timber tree in its southern extension, becomes so in the northern region, which is its home. In the Albany region, I have seen large groves of this tree, quite different from the ordinary scrubby variety, and from which one or two very good saw logs might be cut. Then there is tamarac of good growth, and white

* Geological Survey, 1876, page 423.

spruce cedar in the southern part, a great deal of white birch, and other trees, which will some day be valuable.

In the country, between the upper parts of the Nelson and Churchill, where the green woods, like spruce or tamarac occur, the ground is covered with moss and is apt to be wet. When that is burnt off, poplar grows up and the land is dry.

"If the navigation of Hudson's Bay becomes practicable, it seems to me, if there is much timber in that locality, it will be a valuable item of export. Perhaps you can tell us what the extent of the timber resources of these rivers that fall into Hudson's Bay are—whether there is likely to be a large export of timber from that region? The Moose River, which is perhaps the most valuable for timber, has some perhaps, twenty principal branches that spread out and cover a transverse area of more than 200 miles from the neighborhood of the Ottawa westward, to beyond Michipicoten Valley. These join together and form several fine large streams running northward parallel to each other, and they unite to from the Moose, which falls into the head of James' Bay. The southern parts of these streams are clothed with white and red pine, and, as you go northward, you have good cedar, spruce and tamarac and the Banksian pine. The southern branches of the Albany also afford valuable timber; but northward of that, I do not think you could say the timber would be valuable for export commercially, as long as we have the other rivers to fall back upon. As to the limits of timber generally, I have paid a good deal attention to the subject of scientific foresting, and have prepared maps showing the northern limit of every tree that occurs in Canada. The most northern species is the spruce, the limit of which runs from Seal river north of Churchill to the mouth of the Mackenzie river, or in a north-westward direction; and on the other side of the Bay, from Richmond Gulf up to Ungava Bay in Hudson's Bay and Straits, and down to the Straits of Belle Isle. The whole country to the southward of that line is wooded."

"You speak of that being the northern limit. For a considerable distance south of that the timber would not be merchantable? No. It is scrubby, but it becomes larger as you go south and westward. In my last report there is a map showing the northern limits of thirty of the principal trees. We have about sixty species of timber trees east of the Rocky Mountains and thirty west."

Sir Geo. Simpson testified that the timber about James' Bay was "small stunted pines."

Dr. Rae, at the same time, said that about Moose Factory, on James' Bay:—"There are pine woods. It is well-wooded. There are extensive forests. About two, or two-and-a-half feet in diameter is about the largest I have seen."*

GENERAL FISHERIES.

Besides the whale, cod and salmon fisheries, the waters of Hudson's Bay, and the rivers falling into it, contain many excellent oil-producing and edible fish.

Hearne says he saw the walrus in such numbers, on the sea shore north of Churchill, "That the whole beach seemed to be in motion," and

he also says, "seals of various sizes and colours are common in most parts of Hudson's Bay, but most numerous to the north." "Sea unicorns are also known to frequent the Bay and Strait." "White whales (porpoises) are also very plentiful in those places."

Dr. Bell reports finding the pike, perch, herring, whitefish, grayling, sea trout, sculpin and caplin, besides pike, pickerel, carp, chub and speckled trout in their proper waters. White porpoise abound, and the walrus and narwhal are killed in considerable numbers.

Dobbs mentions the same list of fish as given above, and states that 14,000 "fish larger than mackerel" are taken at Albany in a season for the winter's supply.

Fox speaks of the great store of fish to be found.

Hearne enumerates "mussels, crabs, starfishes, whilks, periwinkles, cockles, scallops, and many other kinds, which are found on the beaches in great plenty."

The whitefish abound in some of the rivers, and are, at places, caught in winter through holes cut in the ice.

SALMON FISHERIES.

It is not generally known that large quantities of salmon are taken in Hudson's Bay and Strait, and from one or two of the rivers of the Hudson's Strait, a considerable number of barrels, in a salted condition, are exported every year by the Hudson's Bay Company.

Dr. Bell caught a specimen of salmon, attaining a weight of about 10 lbs., on the east coast of the Bay. He found the Indians fishing with gill nets, set in about two fathoms of water. They were taking them in considerable numbers, the fish having a strong resemblance to the common salmon (S. Solar) in outline, fins, head and mouth, and the flesh the the same color and flavor. The average size is however smaller, the largest which they saw during the summer weighing only about 10 lbs., but many were nearly as heavy. They were caught all along the eastern coast. The Indians also killed them with spears (like those used by the Mic-Mac Indians), in the mouths of small rivers, and in the shallow arms of the sea.

According to Hearne, the season for salmon in the neighborhood of the Churchill River begins at the latter part of June and ends about the middle or latter part of August. This writer states that in some years salmon are so plentiful near Churchill River, that he has known upwards of two hundred fine fish taken out of four small nets in one tide, within a quarter of a mile of the fort.

Prof. H. Y. Hind says:—"If Hearne be correct in his statement, that the season begins the latter part of June, it is a fortnight or three weeks earlier than the season for salmon on the Labrador coast."

At the Moravian Mission Stations, Hopedale and Nain, on the Labrador, and not more than three hundred miles north-west of the Straits of Belle Isle, the salmon are always expected at the first spring tide after the 16th of July, and the cod generally approach the coast about the same time as the salmon. Indeed, it should be stated, if Hearne's statement be correct, the commencement of the fishing season on the north-west coast of Hudson's Bay is as early as at any part of the Labrador coast, north-west of Hamilton Inlet.

Mr. E. S. Mathieson, C. E., who spent last winter at York Factory and on the Nelson River in engineer work for a railroad company, states that Hearne is perfectly correct about the abundance.

This, in the future, will be of great importance to the markets in this Province and to the south. A large number of carloads of whitefish and other kinds, are now being sent south and east as far as Chicago and even to Buffalo, the fish going from Lakes Winnipeg and Manitoba. These markets can be supplied with salmon from Hudson's Bay, three weeks earlier than from the Northern Labrador.

When the Indians and fur traders are fishing for salmon, on the coast of Hudson's Bay, north of the Nelson River, the entire coast of Labrador, during an average of years, is blocked by ice, from the Straits of Belle Isle to Cape Chudleigh, and is inaccessible to fishermen.

This fact is a most important one.

Ellis mentions finding plenty of salmon at the mouth of the Nelson River.

"Salmon are in some seasons very numerous on the north-west side of Hudson's Bay, particularly at Knapp's Bay and Whale Cove. At the latter place I once found them so plentiful, that had we been provided with a sufficient number of nets, casks, and salt, we might soon have loaded the vessels with them."

The steamer "*Diana*, owned by the Hudson's Bay Company, is a refrigerator vessel, and is regularly in the trade to Ungava Bay. She takes cargoes of fresh salmon to England, where it is sold for from 1s. 6d. to 2s. 6d. per pound. Some of her cargo has been reshipped on to Australia.

The Rev. M. Harvey, of St. John's, Newfoundland, writes me as follows:—"We have here a fleet of over twenty fine sealing steamers. At present they are laid up for the most part for nine or ten months of the year, as remunerative employment cannot be found for them, when the seal fishery is over. These would make a splendid fleet for the navigation of Hudson's Bay, which could be easily carried on during four months of the year. They are about 500 to 650 tons burthen, and their service could be had cheap. It would be a good plan to charter a couple of them for experimental purposes. Not more than three or four have been crushed during the 20 years which have elapsed since the introduction of steamers in the seal fishery. These were lost by being "nipped" in the heavy arctic ice through which they plough their way in search of seals."

The Rev. M. Harvey is the author of the works on Newfoundland.

These vessels might be used in the salmon trade: and, as salt has been found in large quantities close to some of the streams which flow into Lake Winnipeg, it would seem as if a profitable and extensive trade is awaiting development in that respect alone. Both fresh and salted salmon may yet rank amongst the heaviest exports of Hudson's Bay.

WHALING.

Before a Committee of the British House of Commons, Dr. Rae, in answer to a question:—"Do you suppose there would be a sufficient quantity of fish of that kind (whales) to support a settlement?" testi-

fied :—" I think not. When I went in 1846-7, I saw a good many whales. When I went in 1853-4, I saw only one or two small ones."

Before the same Committee, Captain David Herd, who commanded coasting vessels, in answer to the question :—" What are the capabilities of Hudson's Bay with regard to whaling, answered :—" I have been going there for the last 22 years and have never seen a whale but once, that was last year, I saw one whale." "Assuming that there are whales there, is the state of the sea, with regard to ice, such that whaling can be carried on in it ?" "No, I do not believe that it could. I do not believe myself that whales will ever go amongst ice."

Mr. A. Isbister, witness before the same Committee, stated :—" In Hudson's Bay itself, there are also very good facilities for the whale and seal fishery. It was stated the other day, I think, by one of the commanders of the coasting ships, that he had seen no whales ! I happen to have a book here containing an official report, laid before Parliament, of the imports from Hudson's Bay for ten years, from 1738 to 1748, in which it is stated that the Company imported in the year 1747, as many as 1,314 whale fins, which of course represented more than 600 whales. It does not say whether they were black or white whales."

It would seem in the light of later evidence, that Mr. Isbister was correct in his statement, and that Dr. Rae and Capt. Herd did not seem to know much about the extent of the whale fishery, although the latter had sailed in those waters for 22 years.

For half a century, at least, the north-western part of Hudson's Bay has been regularly frequented by a large number of American whalers, and, I am told, by whalers from Dundee and other Scotch ports.

An inspection of the report of the United States Commissioner of fish and fisheries for 1875-76 fortunately gives us some information as to the extent of the whale fishing in Hudson's Bay. That report shows that between the years 1861 and 1874, American whalers made about 50 voyages, giving an average of rather more than four vessels for each year, and the average catch annually amounted in value to $124,000 worth of that fish. The total of the eleven years' catch amounting to $1,871,023.26, there being 22,241 gallons sperm oil, 804,265 gallons whale oil, 399,729 pounds of whalebone. It is also to be remembered that the returns submitted are those of very recent date. In all the early history of American whale fishery, Davis' Strait was a favorite whaling ground, and vessels appear to have gone into Hudson's Bay, and out again into Davis' Strait, but the record of their catch are given as being generally made in Davis' Strait

The presence of so many whales in Hudson's Bay suggest conclusions as to the supply of food for this enormous marine mammal."

The question has been asked, Where do the whales come from that are found in the north-western part of the Bay ? I happened to meet with a rather peculiar passage in a scientific work lately published.

During the years 1862-66-68-70-71 the bark *Ansel Gibbs*, sailing from New Bedford, Mass., whaled in Hudson's Bay, being lost there in the latter year. From the book referred to I copy the following :—" The daily papers have lately referred in brief terms to the recent capture of a whale in the Artic Ocean, with a harpoon embedded in its flesh. The whale in question was taken by the ship *Cornelius Howland*, off Point

Barrow, the northernmost cape of Alaska, and off the mainland of North America. The harpoon was marked "A. G." referring, as was supposed to the ship *Ansel Gibbs*, of New Bedford, which has been engaged for ten or twelve years in the whale fishery. Cases have before occured of whales being captured at Cumberland Inlet with harpoons in them that must of have been inserted in the Artic Ocean, but this is said to be the first instance authenticated in which the movement of the whale was in the opposite direction."

This would look as though whales entered Hudson's Bay by its several entrances, and went out again as in the other whaling grounds.

In a letter to me received a few days ago from a whaling captain in New Bedford, it is stated that whalers come into the Bay from Fox Channel.

Robson, Hearne, Dobbs and Ellis, as well as other early writers on Hudson's Bay, constantly refer to the presence of black whales in the Bay as well as the swarms of "white whales" which abound all over the Bay proper.

I have not on hand (though I have sent for them) the statistics showing the quantities and value of the oil, whalebone, etc., taken from the Bay to Great Britain by the whalers from Dundee and other ports, but I am informed on good authority that the amount is very large. An American whaling captain states that he saw a whaling vessel from Dundee.

Ellis says that at one place in the northern part of the Bay: "Fox saw no less than forty whales at one time, and it is a thing out of question, that all sorts of fish, but more especially the larger sorts, sea-unicorns and whales, are found in great numbers in these northern parts."

I give several extracts from American whalers under another heading, which show the dates at length of the whaling season in the Bay proper.

One captain reports, on the 15th May, that he got ready for whaling and cut the ship out of the winter's ice.

Several others say that they come out when the season is over, or up to November 1st.

Sir Edward Parry reports having seen black whales in Fox Channel, and his crew killed one on the 1st August, 1882.

Fox Channel has two connections with Hudson's Bay, one on each side of Southampton, and whales can range in and out through these as well as through Hudson's Strait.

"My comfort is, that the quantity of whales and sea-mors that place affordeth, will, when whale-oil comes into request, drive the merchant to send the mariner to visit the Isle of Brooke-Cobham."

Fox predicted exactly what has come to pass, for at Marble Island is the chief whaling ground of the Americans, who now have an average of at least four vessels, each year, at that place.

It is therefore positively proved that the whaling grounds of the Bay are exceedingly valuable, and a source of profit to our American cousins.

It may be interesting to some to know that the whalers wintering in Hudson's Bay are in size from the *Isabel*, of 95 tons, to the *Northern Light*, of 513 tons.

The *Pioneer*, in 1864, left home on the 4th June and returned 18th September, same year, with 1,391 barrels oil and 22,650 pounds of whalebone. Her cargo sold for $150,000. That same year the value of cargoes taken out of the Bay amounted to $427,638.86.

The above figures are from the report of the United States Commissioner of Fisheries, and are therefore accurate.

I may say that several times I have heard the statement made that the value of the catch of the years 1861-74 was $10,000,000. This is wildly absurd, the figures being, according to the reports for those years, $1,371,023.36.

Inaccurate quotations are as impolitic as they are absurd and misleading.

COD FISH.

Little seems to be known as to the extent of waters in Hudson's Bay, where the cod is to be found. Dr. Bell says the Bishop of Moosonee informed him that he had heard of a few "real" cod having been caught near Whale River on the east main, where the water is deep, and Dr. Bell himself has seen plenty of rock cod taken at various places on the east coast of James' Bay. He says:—"There appears to be no reason why the common cod should not be found in Hudson's Bay. The conditions as to temperature, depth of water, etc., are favorable, and its food, especially the caplin, is abundant. The latitudes of the prolific fishing-grounds of the Atlantic coast of Labrador are the same as those of Hudson's Bay. The question whether or not Cod-fishing grounds are to be found in this great Bay is so important that it deserves a thorough trial."

Hearne, in a foot note, remarks:—"In the fall of 1768, a fine rock cod was drove on shore in a high gale of wind, and was eaten at the governor's table, but I never heard of one being caught with a hook, nor even saw an entire fish in those parts, their jawbones are, however, frequently found on the shores. Kepling (caplin) in some years resort to the shores near Churchill River in such multitudes to spawn, and such numbers of them are left dry among the rocks as at times to be quite offensive."

"In 1877, cod and caplin were taken in abundance by Newfoundland craft in the vicinity of Hebron, not far from the entrance to Hudson's Straits, about the 15th of August. That the caplin occurs in immense shoals in northern Hudson's Bay has long since been noticed by Hearne and others. This fish is also in abundance on the coast of south Greenland, but the point to which special attention is directed, as regards the movement of the salmon, the caplin and the cod, is the broad fact that the season in northern Hudson's Bay is so much earlier and so much longer than on the Atlantic coasts of northern Labrador, where the fishing interests have assumed such imposing proportions. Hearne tells us that the salmon fishing at Churchill begins in the latter part of June; he also mentions the occurrence on that coast of innumerable shoals of caplin coming in shore to spawn as soon as the ice leaves the coast. Generally the caplin precede the cod and salmon on the Newfoundland coast. It is not likely that the habits of this fish have changed under similar conditions in Hudson's Bay.

"Hearne could scarcely have made us a better enumeration of the general food of the cod than he has given us in his narrative, and the only conclusion which suggests itself in relation to his remarks upon the cod, is, that this fish not being an article of commerce in Hudson's Bay, has never yet been sought for there. When the food of the cod is stated to be in great abundance, it is more than probable that the voracious fish will be relatively abundant."†

"When we had run almost across the Bay, and were got near some banks to the northward of Churchill River, the captain expressed his regret that they were not tried for cod; for it seemed highly probable, he said, that there was almost as many to be taken there as at Newfoundland."‡

MILITARY.

It does not seem to be generally known that on three occasions bodies of British regular troops have been brought from England in sailing vessels through Hudson's Strait and Bay, landed at York Factory, and proceeded by the usual water route to this city.

In 1846, a wing of the 6th Foot, a detachment of Artillery, and a detachment of Royal Engineers numbering 383 persons, including 18 officers, 329 men, 17 women and 19 children, arrived at York Factory on the 7th August, and after a stay there of eleven days, proceeded to Fort Garry, which they reached in thirty days time without any casualty.

The troops carried with them one nine-pounder and three six-pounders, and left twenty-four guns at York, to be forwarded after them.

These troops returned by the same route, in 1848, and a squad of 70 pensioners took their place that same fall, and these were again followed by a like number in summer of 1849.

Some of these soldiers and their descendants are amongst our most respected and worthy fellow-townsmen.

IMMIGRATION.

It must not be lost sight of that nearly all the early white settlers of this Province and the many settlements of the Northwest, came in *via* the Hudson's Bay. Lord Selkirk, in 1811, sent out the first detachment others followed, and the first agriculturists who raised the grain which has since become so famous for its quality, experienced the delays incidental to the long passage in sailing ships.

Since that day, it is not to much to say, that thousands have travelled by the same route, in perfect safety.

This fact cannot be denied, and the statement of it speaks volumes in favor of the safe navigation of our northern waters.

We have, in the very heart of our Dominion, an immense inland sea which never freezes, it is connected with the Atlantic Ocean by a wide passage which never freezes over, and is open for navigation for at least five or six months, if not during the whole year. This great body of salt water has emptying into it a large number of rivers, many of them

* Samuel Hearne, 1796 † Hind's Report. ‡ Robson, page 20.

navigationable for large river steamers for long distances inland, they are well stocked with the finest edible fish, and in some places their banks are clothed with timber, much of which is valuable for export. The islands of the Bay, and many localities on the mainland are rich in mineral bearing rocks and forms of coal. The northern waters are frequented by schools of whale which are already affording a bountiful harvest to the enterprising whalers. At all points in the great Bay, porpoises abound, which supply hides and oil. Furs are obtained from the full list of fur-bearing animals frequenting the adjacent country. Large game supports, in a great measure, the Indian population. Feathered game is so plentiful, that at a single post, 36,000 geese are killed in the autumn, as the year's supply. Vegetables are raised at all the forts in the southern part, and at some of those in the north. Horses, cattle, etc., are kept, and abundance of fodder is found for them. At least three harbors are frequented by ships, and for 274 years sailing vessels of all descriptions, from the pinnace of 20 tons to the 74-gun man-of-war, have anchored in them after passing through the Strait and across the Bay. British regular troops and immigrants have sailed through the Strait and landed at these harbors.

Should we not, as Canadians, anxious for the full development of the great natural resources of our country, take what nature offers so freely, and make use of her bountiful gifts.

SOURCES OF REVENUE.

1st.—Transportation of grain from Manitoba, the N. W. Territories, Minnesota and Dakota (in the United States); these two states alone have 15,000,000 bushels of wheat available for export annually at present, and taking Manitoba and the North-West at 5,000,000 bushels more, available for export on the completion of the line, we reasonably calculate on 20,000,000 bushels of wheat to ship to Europe; this would make 50,000 car loads of 400 bushels or 24,000 pounds *each*, equivalent to 5 train loads of 28 cars per train, daily throughout the year, and the quantity will surely and steadily increase, bearing in mind that this is only one of many sources of revenue.

2nd.—Passengers' and settlers' effects and mails from and to Europe: viz.: all importations from Europe for this North-West country, which is at present very large and will increase yearly.

3rd.—Transportation of railway iron, rails, etc. It may be fairly assumed that all the rails and fastenings will be brought from Europe *via* this route, and as railway construction is only beginning in this country, large and increasing quantities for many years must come *via* this railway, not only for construction but also for renewals, also locomotives, etc., on account of the enormous saving which will be effected in transportation as against the Atlantic Ports.

4th.—Timber alone, existing along the line of railway and country tributary to it will be a large source of revenue to the road; this will find a market in England and also for local purposes. The quantity of available timber tributary to the road is safely estimated by experts at 26 billions of feet board measure, which, taken at 7,000 feet per car,

would take sixty years to ship at the rate of eight trains of twenty-four cars each per diem, running 300 days in the year.

5th.—Coal for local consumption and manufacturing purposes.

6th.—Transportation of cattle. Cattle and sheep are an important industry in the North-West Territories, and also in Montana, in the United States. They can be driven to the Grand Rapids, and fatten on the way through a country abounding in the freshest grasses, with abundance of water; consequently, they have no suffering or shrinkage, and they are worth more there than at the port of Montreal, for that reason, for shipment to Europe, and with the great advantage of only having railway transit of twenty-four hours' duration. Horses from the best imported English and American breeds are being raised on the western ranches for supplying the European markets, great care being taken by the breeders to select the best strains of two different kinds, many ranchers making the industry a specialty, sparing no expense to attain suitable stock for the production of racers, hunters, cavalry, carriage and farm animals.

7th.—Transportation of all kinds of salted, fresh and canned fish to supply southern, western, and eastern markets; this industry will increase very rapidly soon after the construction of the railway, and will include all products arising from the fisheries, such as oil, porpoise hides for leather, etc.

8th.—Iron ore for local manufactures, lead, gypsum, petroleum, moulding sand, building stone, etc.

9th.—Agricultural products for shipment, such as cheese, butter, tallow, hides, frozen fresh beef, etc.

10th.—Local passengers and way freight, arising out of building new towns, including plant and supplies engaged in the mining, lumbering and fisheries industries, and the traffic arising out of tourists to the sea coast.

11.—The available assets of the Company are:

Free grant of 6,195,200 acres of land on the main line alone, at $1	$6,195,200 00
Timber on Company's reserve, 2,000,000, at $1 per M	2,000,000 00
	$8,195,200 00

The estimated receipts on timber, lumber and grain alone, tributary to the road nett, shews a safe annual revenue of 8 per cent. on the total cost. In addition to this, there will be large and increasing receipts from the transport of passengers, coal, live stock, fish, furs, minerals, etc., etc., which cannot be accurately estimated on until the road is opened for traffic.

The railways in the United States to the south of us have reaped the best harvest from these swamp lands: first, a crop of ties; second, telegraph poles; third, fence posts; fourth, fence rails; fifth, hop poles; estimated at $200 per acre nett on timber alone.

The Great Saskatchewan river is entirely tributary to the Hudson's Bay Railway, and not to the C. P. R., and it is settling up fast. The

branch line will be a very large tributary source of revenue to the main line, and the Canadian Pacific Railway and its branches, west, south and south-west of Winnipeg, are all tributary to the Hudson's Bay Railway, it being the shortest road to the sea; no corporation, however powerful, can coerce the channels of commerce, and the outlet is *via* Hudson's Bay.

When the monopoly clause expires, and foreign railways can cross the boundary line, the carrying railway trade of a large radius of this Western continent will find its seaport at Hudson's Bay, and over this road.

With the above sources from which a revenue is to be derived, and a country rapidly filling up, with an Agricultural and Mining population, combined with the fact which should be strongly impressed upon intending emigrants, that the Great North-West has now the only extensive fertile areas of farming lands available for settlement on this continent, the United States having disposed of nearly all of their Agricultural lands.

CHARACTERISTICS OF THE RAILWAY.

The first consideration in building the railway is perfect location or alignment, consistent with tapping the important points where revenue is to be derived from, keeping curvature at a minimum, and the grades as easy as the country will admit of, and building the railway bank as high as the snow-fall is deep, in order to have perfect operation throughout the year.

DISTANCES.

The main line distances will be as follows:—

From.	*To*	*Miles.*
Winnipeg	Little Saskatchewan	149
Little Saskatchewan	Grand Rapids	89
Grand Rapids	Sea Falls	114
Sea Falls	Fox River	181
Fox River	Limestone Falls	60
		593
Limestone Falls to Liverpool		3024
Winnipeg to Liverpool		3617

RIGHT OF WAY.

The right of way, or ground enclosed by the Company's fences, is 99 feet wide or 1½ Gunter's chains, containing 12 acres per mile, excepting at terminal points where greater widths are required for erecting shops and working yards, etc., also at way stations, and at the end of divisions, in almost all cases the lands will be free to the Company, thus reducing the cost of construction.

It is advisable to build the line of railway aside from the centre to allow for constructing a double track which may be required much earlier than at present anticipated.

GRADING.

The banks to be 12 feet wide at formation level with slopes one and one-half to one, and the cuttings to be 22 feet wide at formation; slopes in earth cuttings one and one-half to one, in rock one-fourth to one.

GRADIENTS.

The gradients of the railway ascending northerly not to exceed 26-40 per mile with the traffic and ascending southerly 52-80 per mile so as to give the greatest carrying capacity.

CURVATURE.

Curvature will be reduced to a minimum in all cases, and not to exceed a 4-0 curve or a less radius than 1433 feet on the main line.

BRIDGING.

The bridging of rivers of 100 feet span and upwards are intended for permanent structures of the most approved Truss pattern with masonery substructures built wide enough to admit of a double track when required; culverts and small waterways to be built of timber to admit of rapid construction, to be replaced by permanent structures without impeding traffic hereafter.

GUAGE.

To be standard guage of 4 feet, 8½ in. between rails.

RAILS AND FASTENINGS.

Road to be laid with steel rails of approved section and quality weighing 56 per yard, and fastened with fishplates or splices of steel with four bolts and nuts to each joint.

TIES OR SLEEPERS.

Of the best available timber eight feet long not less than six inches face and six inches thick to be laid two feet centres or 2,640 per mile.

SWITCHES AND FROGS.

To be of the best working patterns in use. Standard—1 in 9.

SIDINGS.

20 miles of sidings are allowed at the two ends of the road; two to three, as may be required, at the ends of divisions, and one mile at each way station.

BALLASTING.

2,000 cubic yards has been allowed throughout both for siding and main line.

FENCING.

Posts to be eight feet long and not less than four inches in diameter at the small end, to be placed 16½ feet apart, and the right of way to be enclosed with five strands of barb wire fastened securely to each post.

TELEGRAPH LINE.

Would require 32 posts per mile throughout, with ordinary gauge of wire, instruments and batteries.

WATER STATIONS AND COAL SHEDS.

To be about 15 miles apart.

SECTION HOUSES.

One to each five miles of railway for maintenance purposes are required to keep workmen together so that they and their lorries and tools may at all times be immediately available for services required from them. At unimportant points these houses could be used for way stations until such times as business increases sufficient to warrant the erection of regular stations.

WAY STATIONS.

Combined for passengers and freight purposes, with dwelling for agent overhead, will be built at first only at those points where fuel and water is necessary, and afterwards at a distance of ten miles apart as the traffic developes, and at all divisional points suitable buildings will be erected as the requirements of traffic demands. At terminal points where the general offices are established, buildings will be erected capable of accommodating all the staff of the various departments engaged in operating the railway, with freight sheds, engine houses, turn-tables, etc.

ELEVATORS.

At Sea Falls and Limestone Falls, elevators will be built of sufficient capacity to accommodate the traffic.

DOCKS AND WHARVES.

of suitable dimensions will be required at Sea Falls and Limestone Falls.

LOCOMOTIVES AND ROLLING STOCK.

Locomotive engines, both for passenger and freight service, must be of the strongest and best types specially constructed for this climate and water, from designs furnished from, and adapted to the requirements of this country.

The rolling stock to be of the best manufacture in use, and interchangeable in their parts.

The following detailed statement of cost of construction is arrived at upon the surveys and explorations of Mr. Adrian Neison, C. E. and Explorer, and Mr. Bayne, C. E., Dr. Bell, of the Geological Survey, and from other reliable sources.

The estimated cost may be reduced by having less sidings, ballast, rolling stock, stations, etc., and only furnish as the railway traffic develops.

CONSTRUCTION.

CLASSIFICATION.	QUANTITIES. NO:	QUANTITIES. UNITS.	RATES.	COST.
RIGHT OF WAY—				
99 ft. wide, 12 acres per mile	7,116	Acres.	.....	Free.
LAND—				
For Shops and Stations, Winnipeg....	200	"	$ 500	$ 100,000
CLEARING—				
7,116 acres, less between Winnipeg and Selkirk, 360 acres	6,756	"	20	135,120
CLOSE CUTTING—				
One-quarter chain wide for 593 miles..	1,186	"	15	17,790
GRADING—10,000 cubic yards per mile—				
Sidings, 104 miles, equal	1,040,000	cub. yds.	27c	280,800
Main Line, 507 miles, equal	5,050,000	"	27c	1,363,500
Of Rock Section, 88 miles, equal	88	miles.	$16,000	1,408,000
Off-take—Ditches and cutting Beaver dams	100	"	1,000	100,000
BRIDGING	.....	.....	.....	1,086,514
Tressels, Road Crossings, Cattle Guards, Culverts	593	miles.	1,000	593,000
TIES—2,640 per mile—				
Main Line	1,565,520	ties.	25c	391,380
Sidings	274,560	"	25c	68,640
RAILS—88 tons per mile, 56 lbs. per yard				
Main Line	52,184	tons.	$ 30	1,565,520
Sidings	9,152	"	30	274,560
FISH PLATES—Three tons per mile, 16 lbs. per pair—				
Main Line	1,789	"	35	62,265
Sidings	312	"	35	10,920
BOLTS AND NUTS—One ton per mile, 5 lbs. per joint—				
Main Line	593	"	60	35,580
Sidings	104	"	60	6,240
SPIKES—Three tons per mile, $\frac{5}{8} \times 5\frac{1}{2}$ —				
Main Line	1,779	"	50	88,950
SIDINGS	312	"	50	15,600
POINTS, CROSSINGS & SWITCHES—				
Complete	300	sets.	110	33,000
TRACK LAYING—Distributing Ties—				
Main Line	593	miles.	325	192,725
Sidings	104	"	325	33,800
BALLASTING—2,000 cubic yards per mile				
Main Line	1,186,000	cub. yds.	40c	474,400
Sidings	208,000	"	40c	83,200
TELEGRAPH LINE—Complete	593	miles.	215	127,495
FENCING—Complete—				
Four Strands Barb Wire	593	"	700	415,100
SECTION HOUSES—Five miles apart—	120	.....	1,000	120,000

CONSTRUCTION.—*Continued.*

CLASSIFICATION.	COST.	
STATIONS AND OFFICES—		
1 Winnipeg Depot and General Offices	100,000	
1 Little Saskatchewan division terminus	6,000	
1 Grand Rapids "	6,000	
1 Sea Falls "	6,000	
1 Fox River "	6,000	
1 Limestone Falls "	25,000	
54 Way Stations, 10 miles apart, @ $3,000	162,000	
		311,000
FREIGHT SHEDS—		
2 Winnipeg	30,000	
1 Little Saskatchewan	3,000	
1 Grand Rapids	3,000	
1 Sea Falls	3,000	
1 Fox River	3,000	
2 Limestone Falls	30,000	
		72,000
COAL SHEDS—		
Winnipeg	15,000	
Little Saskatchewan	5,000	
Grand Rapids	5,000	
Sea Falls	5,000	
Fox River	5,000	
Limestone Falls	15,000	
At Way Stations 40 @ $2,000	80,000	
		130,000
WATER TANKS, COMPLETE—		
Winnipeg, capacity 60,000 gallons, 2	$10,000	
Little Saskatchewan, " 40,000 " 1	4,000	
Grand Rapids, " " 1	4,000	
Sea Falls, " " 1	4,000	
Fox River, " " 1	4,000	
Limestone Falls, " 60,000 " 2	10,000	
Way Stations, " 40,000 " 40 @ $4,000	160,000	
		$196,000
MACHINE AND WORK SHOPS—		
Winnipeg	200,000	
Little Saskatchewan	10,000	
Grand Rapids	10,000	
Sea Falls	10,000	
Fox River	10,000	
Limestone Falls	200,000	
		400,000
ENGINE AND ROUND HOUSES—		
Winnipeg	60,000	
Little Saskatchewan	20,000	
Grand Rapids	20,000	
Sea Falls	20,000	
Fox River	20,000	
Limestone Falls	60,000	
		200,000
TURN-TABLES—		
Winnipeg	3,500	
Little Saskatchewan	1,500	
Grand Rapids	1,500	
Sea Falls	1,500	
Fox River	1,500	
Limestone Falls	3,500	
		13,000
Carried forward		$1,322,000

CONSTRUCTION.—*Continued.*

CLASSIFICATION.			COST.	
Brought forward				$1,322,000
SIDINGS (Cost included on sheet No. 1.)—				
Winnipeg	20	miles.		
Little Saskatchewan	2	"		
Grand Rapids	3	"		
Sea Falls	3	"		
Fox River	2	"		
Limestone Falls	20	"		
	104	miles.		
GRAIN ELEVATORS—				
At Limestone Falls				1,000,000
DREDGING—				
At Seal Island, Nelson River—				
1,408,000 cubic yds. at 25c				352,000
DREDGING MACHINERY—				
6 dredges complete at $45,000				270,000
DOCKS AND WHARVES—				
Limestone Falls—30'x30'x2000'			267,000	
Sea Falls			20,000	
				287,000
ENGINEERING AND MISCELLANEOUS—				
593 miles at $2,000.				
Engineering—Surveys, etc.				
" Instruments and Outfits.				
Organization office Furniture, Stationery, Printing, Rents, Fuel, Lighting and Taxes, General Superintendance and Law Expenses				1,186,000
TRAIN SERVICE—				
During Tracklaying and Ballasting				577,920
COFFER DAMS—				
For Bridging				115,000
INCIDENTALS—				
5 per cent. on construction ($14,233,019)				711,651
Total				14,944,579

EQUIPMENT.

DESCRIPTION.	No.	RATE.	AMOUNT.
LOCOMOTIVES	100	$10,000	$1,000,000
CARS—			
Box	2,000	600	1,200,000
Flat	1,000	400	400,000
Caboose	80	2,000	160,000
Passenger, 1st class	30	6,000	180,000
" 2nd class	30	4,000	120,000
Sleeping	10	12,500	125,000
Mail	10	4,000	40,000
Baggage and Express	10	2,500	25,000
Stock	60	500	30,000
Refrigerator	10	1,000	10,000
Hand	140	70	9,800
Lorry or Rubble	140	50	7,000
Iron	12	60	720
Inspection or Velocipede	6	100	600
Wrecking with crane	3	1,000	3,000
SCALES—			
Truck 100,000 capacity	6 sets	2,500	15,000
SECTION TOOLS	120 "	100	12,000
STATION FURNISHINGS	60 "	300	18,000
Total equipment			$3,356,120

RECAPITULATION.

Construction	$14,944,600
Equipment	3,356,120
Grand total	$18,300,790
Total cost per mile	$30,000
" " " " without equipments	25,202

I have the honor to be, Sir,

Your obedient Servant,

WILLIAM MURDOCH, C. E.